CORE COMPOSITION OF FERRUGINOUS BODIES FROM FORMER ASBESTOS WORKERS

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The terms "ferruginous body" and "asbestos body" are often used interchangeably. However, the potential for various non-asbestos entities such as glass fibers, fibrous aluminum silicates or silicon carbide forming the core of such bodies was established in animal studies. This awareness has led to use of the term pseudoasbestos bodies when the structure is not clearly on an asbestos nucleus and use of the nonspecific term "ferruginous body" unless core analysis has been achieved.

The use of electron microscopy for core identification has been recognized and has been correlated with several methods for collecting ferruginous bodies from tissue. The problems recognized in all previous methodologies consists of a lack of exposed core material in a large number of the bodies. This morphological configuration prohibits the use of either electron diffraction or x-ray energy dispersive analysis due to interference of the coating material.

A method developed in our facility permits selective removal of the ferruginous coat and therefore permits analysis of the core material.

The application of this technique in the present study was used to determine what, if any, entities other than asbestos would be found in ferruginous bodies from former amosite asbestos workers and to determine what distinguishing physical features might characterize the core material.

The tissue selected for digestion was from formalin fixed lung parenchyma of six occupationally exposed individuals. The presence of abundant ferruginous bodies had been confirmed in previous digestions as well as by review of tissue sections. A small portion (0.2 gram) of wet lung parenchyma was dissected and placed in 4 ml of previously filtered (through 0.2μ Nuclepore [Nuclepore Corporation, Pleasanton, CA] filter) bleach ("Wright" bleach - 9.2% Sodium Hypochlorite). Each sample was permitted to dissolve for thirty minutes at room temperature. Following gentle agitation, the solution was divided into three equal portions; each was immediately filtered through a 0.2μ Nuclepore filter. The collected material was washed by passing filtered distilled water through the system and the filters were allowed to dry.

Individual bodies from the filters were removed through micro-manipulation under the dissecting microscope and placed in geometrically defined areas on a clean Nuclepore filter. While a few larger ($> 100\mu$) and smaller ($< 15\mu$) bodies were included in the preparation, the average size body was 35μ. The 35μ range was consistent with size commonly found in the digestion of the tissue. Before further treatment, the ferruginous bodies marked on the filters were viewed and recorded in a Zeiss Photo-Microscope III.

The individual filters were respectively treated for four hours with a 40 ml wash of 8% oxalic acid in water baths maintained at 75°C. At the

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end of the treatment interval, the filters were washed with 100 ml of previously filtered distilled water of the same temperature as that of the respective acid bath. The filters were dried, mounted on graphite stubs and studied in an AMR 1000A scanning electron microscope equipped with a United Scientific 30 mm^2 energy dispersive x-ray detector interfaced to a Tracor Northern TN-1710 analyzer.

The coating was removed from 442 isolated ferruginous bodies and the core material was determined to be amosite asbestos consistent with that used in the worker's previous industrial setting. While length has been reported to play a determining role in which fibers become coated, other distinguishing traits including surface irregularities, consisting of etching, fractures, fraying and complexities involving multifibers or fibrillar composition were commonly found. The majority of the uncoated fibers were shorter in length, and also had much smoother surface features with much fewer irregularities than those forming the nucleus of the ferruginous bodies.

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